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# ESCO in Danish municipalities: Basic, integrative or strategic approaches?

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## ABSTRACT

**Purpose:** The aim of this paper is to discuss the possible benefits of involving Energy Service Companies (ESCO) in realising energy savings in municipalities, and how ESCO projects can be formulated very differently in the various municipalities, according to building volume, use of technologies, energy savings, type of collaboration etc.

**Background:** Since 2008, several Danish municipalities have started energy retrofitting of municipal buildings, based on contracts with Energy Service Companies. In spite of the strong growth of ESCOs, there is also widespread scepticism about ESCO, as many municipalities see an in-house approach as a better alternative.

**Approach (Theory/Methodology):** Our research is based on literature studies and on qualitative interviews with Danish municipalities carrying out ESCO projects, as well as with ESCO providers.

**Results:** Our studies suggest that different ESCO approaches are being used in Danish municipalities, which we label *the basic*, *the integrated* and *the strategic* ESCO approaches. The three approaches include different ambitions, technologies, economies and innovation potentials. Whereas the basic approach implies a 'traditional' guarantee-based model, with relatively few buildings, energy retrofitting and low investments, the integrative and strategic approach include a higher degree of partnership, a more ambitious building renovation approach, and more innovative understandings of facilities management. We also compare ESCO with energy retrofitting as an in-house approach, which many municipalities are considering.

**Practical Implications:** We suggest the practical implications of our findings, as a short characteristic of the different approaches, intended for municipalities to start up energy retrofitting of municipal buildings.

**Keywords:** ESCO (Energy Service Companies), municipal buildings, energy retrofitting, innovation, facilities management

## 1 INTRODUCTION

An Energy Service Company (ESCO) is generally defined as a company that is engaged in developing, installing and financing comprehensive, performance-based projects (Vine, 2005). An ESCO company provides a package consisting of technology, financing, project management, education and counselling. In an ESCO contract, the ESCO provider guarantee energy saving and becomes responsible for eventual risks for not achieving defined energy savings, instead of the client (e.g. a building owner). This is making investments in energy savings more calculable and thereby attractive for clients. ESCOs play an important role for improving energy efficiency in the existing building stock in Europe (Marino et al., 2010). The EU Directive on Energy End-user Efficiency and Energy Services (2006) sent a strong signal to European member states to support the formation of energy services, and in many European countries there is a growing ESCO activity. In Denmark, ESCO plays a central role in the Danish government's strategy for reducing energy use in buildings from April 2009. ESCO contracting is also being promoted by the Ministry of the Interior and Social Affairs to increase municipalities' use of Public Private Partnerships (PPP).

So far, the main growth of Danish ESCOs has taken place in the municipal sector. In 2008 a handful of municipalities had started ESCO projects in municipal buildings, whereas in the beginning of 2011, 15 municipalities (of 98 municipalities in Denmark) have signed ESCO contracts or are preparing to do so. The ESCO model used in Danish municipalities does not include private or third-party financing, thus 'Energy Performance Contracting' (EPC) would be a more correct term to use. As 'ESCO' however is used widely in a Danish context, the paper will also use this term. In the Danish context, 'ESCO' is used for the companies as well as for the types of agreements between the client and the provider. In the Danish municipalities, ESCO contracts in general include guaranteed energy savings (on heating and electricity) for a selected part of the municipal building portfolio, based on retrofitting and different energy renovation initiatives on the buildings, training of facilities management (FM) staff, and energy labelling of buildings. Contracts are typically of 8-12 years' duration.

As the main parts of the contracts are from 2008 and on, the Danish experience of using ESCO is still new, and debates are still going on between municipalities on viewpoints and the pros and cons of ESCO contracting. One of the main reasons for the reluctant attitude amongst some municipalities, as also mentioned by Bertoldi et al. (2007), is the alternatives to ESCO regarding energy retrofitting. Surveys of Danish municipalities on ESCO show that many consider it more profitable to complete the energy-efficient retrofitting themselves as an in-house project, that they are sceptical about the financing mechanisms in the ESCO arrangement, and that they prefer to keep competences in-house (IDA, 2010; NRGi, 2009). Thus, in this paper we focus on the different municipal arguments for using or not using ESCO, and on the considerations on competences of the municipal FM organisation in relation to improving energy efficiency in municipal buildings.

## 2 STATE OF THE ART

For a long time ESCO has been known as a concept in mainly in USA and Asia, but only in recent years ESCO markets have emerged in EU countries like Germany, Austria, France, Spain, UK, and Sweden. 'ESCO' is however differently defined across EU member states, in practice

covering concepts like EPC (Energy Performance Contracting), ESPC (Energy Service Provider Companies), DC (Delivery Contracting) and others (Marino et al., 2010). Also the types of buildings included vary, as well as ESCO providers, technologies used etc. (Marino et al., 2010). The international research literature on ESCO is however limited, and mainly restricted to experience from the US and Asian markets, as well as from individual European countries. Much of the existing European literature on ESCO concerns the development of framework and concepts from selected countries, on how to promote ESCO, identifying barriers etc., whereas the literature assessing the outcomes of ESCOs is limited. So far the Danish research has also been limited, and mainly consisted of consultants' R&D reports on ESCO, for instance concerning international promotion on ESCO, assessments of market segments for ESCO, reports on test projects on ESCO etc. The only studies of existing ESCO initiatives in Denmark have so far been student reports. The limited research probably reflect that ESCO is a relatively new concept in Denmark, as the earliest ESCO contracts are from 2008, and that the practical experience of ESCO so far mainly concerns the initial phases.

### 3 APPROACH

#### 3.1. Theoretical approach

Our approach to ESCO was not based on the dissemination of ESCO itself, but on the *results* and *outcomes* delivered by ESCO; ESCO should not be seen as a result in itself, but as a way to gain results. Our focus on results and outcomes includes energy reductions and economic savings, but also softer measures, such as innovation potential and development of the municipal FM organisation. Firstly, our research interest focused on the consequences of introducing ESCO contracting in municipalities: What types of changes and innovation does it foster, and will it eventually give the FM organisation another role, especially in relation to promoting energy efficiency also amongst private building owners in the municipality? Secondly, we discuss the 'in-house' strategy as an alternative to ESCO, which many municipalities are considering.

To understand and conceptualise possible outcomes of ESCO, we use 'public innovation' as a theoretical framework. Public innovation includes different types of innovation including product innovation, service innovation, process innovation, position innovation, strategic innovation, governance innovation and rhetorical innovation (Hartley, 2005). ESCO contracting can be seen mainly as process innovation; the products and services are well known, but the way the services are organised is new. Based on Mulgan and Albury (2003) we can differentiate between different types and degrees of innovation (IDeA Knowledge, 2005):

- Incremental, i.e. minor changes and 'add-ons' to existing practices
- Radical, i.e. new services or ways of 'doing things' in relation to the process or service delivery
- Transformative / systemic, i.e. new workforce structure, organisational types, and inter-organisational relationships, leading to major changes in the FM organisation on energy efficiency, as well as strategic and governance innovation.

The main hypothesis based on Hartley is the divide between innovation *within* the governance organisation ('traditional management' and 'new public management') and *beyond* the governance organisation ('networked governance'). According to Hartley (2005), network governance has the biggest potential for creating innovation. Summarising the growing literature on network governance, Sørensen & Torfing defines network governance as "*a relatively stable*

*horizontal interfacing of interdependent, but operationally autonomous actors, 2) that interacts and tries to influence each other through negotiations, 3) that takes place in an institutionalized community, 4) that is self-regulating within a framework defined by the political authorities and 5) in a broad sense contributes to public regulation”*(Sørensen & Torfing 2005:15). In other words: network governance forces the public sector to facilitate networks of otherwise un-coupled actors and to design the network as a set-up where these actors can pursue their own interest, while at the same time contributing to the political goal achievement of the public agency. This is both a substantial organisational and strategic challenge. Along the line of Hartley, we assume that these challenges create new opportunities for innovation in FM in municipalities.

### **3.2 Methodology**

The paper is based on an ongoing research project aiming at identifying the potential and barriers to the application of ESCO contracting in Danish municipalities. The paper is based on a survey of existing Danish ESCO initiatives, international literature studies of ESCO experiences, as well as qualitative interviews with selected ESCO actors. This includes ten interviews with leading civil servants in ESCO municipalities, one interview with a municipality with an in-house strategy, and two interviews with ESCO providers. The interviews are based on a semi-structured interview-guide, focusing on motivations and experiences with ESCO, especially regarding innovative aspects. The interviews were carried out as a mix of face-to-face interviews and telephone interviews.

## **4 RESULTS**

### **4.1 Motivations for energy retrofitting**

The growth in ESCO projects in Danish municipalities should be seen in relation to different political drivers for Danish municipalities to take up energy retrofitting of their buildings in general, either as ESCO projects or as in-house initiatives. In order to understand the Danish context, it is necessary to mention two important drivers:

*Energy labelling and financing:* The Danish Government signed a political agreement in 2005, where the main objective was statutory energy labelling of both public and private buildings. To encourage energy savings, the municipalities were allowed to take out loans for the renovation, if they included the suggestions for energy improvements outlined in the energy label for the buildings, as well as other specified energy-reducing initiatives. Normally, municipalities are not allowed to start building projects by taking out loans, as a way for the state to keep municipal taxes under control. This also includes typical initiatives in an ESCO contract. The ability to take out loans is the main ‘carrot’ for the municipalities to engage in energy retrofitting projects, and thus energy labelling of municipal buildings plays an important role. In order to strengthen this, an agreement from 2007 between Local Government Denmark (LGDK)<sup>1</sup> and the national government settled that all initiatives for energy efficiency with low payback time (< five years) outlined in the energy label on public buildings should be completed within four years.

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<sup>1</sup> Local Government Denmark is the interest group of Danish municipalities. All 98 municipalities are members.

*Voluntary climate agreements:* The climate agenda has been an important motivation for many municipalities, and especially two voluntary agreements are mentioned by most municipalities as motivations for improving energy efficiency in municipal buildings. One is the 'Climate Municipality', a voluntary agreement between the municipality and the Danish Society for Nature Conservation, which obliges the municipality to reduce energy consumption by 2% per year in the municipality as a whole, i.e. not just the municipal administration, but the municipality as a defined area, including private building owners. This includes not just energy for heating of buildings but all kinds of energy, including supply, transport, electricity etc. At the moment, about 2/3 of all Danish municipalities have signed such an agreement. Another voluntary agreement is the 'Curve-cracker agreement' with the Centre for Energy Savings in which the municipality promises to reduce electricity consumption in public buildings by 2% per year.

Finally, some municipalities initiated ESCO because of a dire need for improving building standards. The poor standard of municipal buildings has worsened during the current recession, thus making it more or less impossible for some municipalities to uphold proper building standards. According to these municipalities, ESCO is a possibility for a radical upgrading of the building stock otherwise not possible.

#### **4.2 Different ESCO approaches in Danish municipalities**

Looking closer at the municipal ESCO projects in practice, they are different in relation to technologies, economy, ambitions etc., and subsequently in the way the process is organised, the type of challenges, experience, and the innovative perspectives of the FM organisation. On the basis of our research we identify three different approaches to ESCO:

##### *The basic ESCO approach*

The basic ESCO-approach includes replacement of installations and regulation of energy systems and services like CTS control, monitoring, light steering, heat regulation etc. These technologies are relatively simple and relatively inexpensive but with high energy-saving potential and therefore has a short payback period. The basic ESCOs have the advantage of being practically and politically easily adaptable concepts. This only occasionally involves improvements of the building envelope, making the 'ordinary' FM and building maintenance almost independent of the ESCO project. The limited interaction implies results are primary technical and with limited innovation in relation to the FM organisation and building users. The approach fits well in municipal administrations based on 'new public management' with a large degree of out-sourcing to private partners. For such municipalities the project design and procurement are regarded as relatively unproblematic. The ESCO projects in Vallensbæk, Kerteminde and Greve can be defined as projects having this approach. Challenges observed in the municipalities using the basic ESCO approach include coordination and organisation of central and departmental FM units, distribution of energy savings between buildings, and the level of information from the ESCO provider. These can be seen as challenges that can largely be met with adjustments to the existing organisational set-up. Thus it requires no innovative approach from the municipality to implement the ESCO concept. Although these municipalities report no or limited innovation in their ESCO projects, it might on a general level act as a 'stepping stone' in the development of more integrated concepts, establishing confidence on the

concept, the procedures, the operators etc. These projects might spark off political interest in energy savings, building improvements and CO<sub>2</sub> reductions.

#### *The integrative ESCO approach*

Several municipalities have started more ambitious ESCO projects that include monitoring and regulation in combination with the building envelope, or intensifying focus on improving indoor climate. Such projects require major investments and give longer pay-back times, but they typically include a wider segment of the municipal buildings, if not all buildings. Here, the 'worst' buildings (with the highest savings potential) 'pays' for improvements on the 'best' buildings, for instance by installing photovoltaic panels or other types of renewable energy sources. In these projects, a main challenge is related to identifying the project and the tender, and to structure it in a way that allows as many buildings to be included as possible. Compared with the standard ESCO approach, it requires more work, more local adaptation in terms of coordination between improvements of installations and buildings, and more innovative thinking about how to design the ESCO contract. The integrated approach might not be a formulated strategy at the outset, but might emerge along the process of defining the tender. The municipalities of Høje Taastrup, Halsnæs and Sorø are examples of the integrated approach. In the municipality of Høje Taastrup, the preparations for ESCO contracting showed that the buildings were in a better shape than expected, which made it difficult to find the 15% energy reductions that were the target. Therefore, they had to 'climb up the tree for the high-hanging fruits', by including solar panels on the town hall in the contract. The city council had to accept that the payback period was extended from 15 to 20 years, which according to the civil servant was a great challenge. The municipality of Halsnæs started out with a conservative aim of 15% savings that they were certain that they could find. However other stakeholders raised the question, why the goals were not more ambitious. This led to a new project description, with more ambitious goals, including that 15% of the reductions should come from renewable energy, and 35% from improvements of the building envelope. There are several indications from municipalities using the 'integrative approach' that the ESCO project might become an eye-opener for developing new energy-savings initiatives with actors and institutions outside the municipal administration, using ESCO inspired initiatives.

#### *The strategic ESCO approach*

Introducing ESCO might lead to new ways of thinking about the role of facilities management in developing local competences on energy retrofitting, and general lessons from ESCO contracting as learning process to develop competences on public-private collaboration. Three of the first municipalities to introduce ESCO have developed a collaboration on ESCO (Middelfart, Kalundborg and Gribskov), and can be seen as the Danish spearheads of ESCO. Attracting external financing to develop a handbook on ESCO and other activities to promote ESCO in municipalities has helped them to develop strategic initiatives on ESCO. All municipalities see ESCO as a step towards wider goals. This includes for instance ambitions to be an international first-mover on energy efficiency (Kalundborg), or on ESCO contracting on other building types: private schools, other public buildings, social housing, and private building owners, where the municipal FM organisation will act as the 'network facilitator' (Middelfart). Also, ESCO can lead to considerations of the future municipal building portfolio and the FM organisation (Gribskov municipality). Furthermore all three municipalities have ambitions to develop local competences amongst Small and Medium Sized Enterprises (SMEs) and local enterprises on

energy renovation, which is highly needed. For the three ‘ESCO spearheads’, the energy-retrofitting projects themselves have been rather simple, but they have been implemented in a strategic context that allows the experience from ESCO to be disseminated on an urban scale, as a planned learning process on energy retrofitting and increasing public-private collaboration. Moreover, all three municipalities are considering a new round of ESCOs, based on the lessons learned in the first and basic ESCO project. These cases show us, in line with Hartley (2005), that ‘network governance’ approach holds a strong innovative potential compared with innovation within the governance organisation.

The different ESCO approaches with the different types of challenges and potential for innovation are outlined in Table 1 below.

ESCO approach	Basic	Integrative	Strategic
<b>Characteristic</b>	Focus on installations and control in building retrofitting  High energy savings, low risk  Simple contracts. Low level of coordination between ESCO and municipal FM required	Focus on installations and building envelope  Energy savings finance building improvements  Complex contracts Partnership model required	Focus on using ESCO as a learning process.  Disseminating competences on energy retrofitting on an urban scale, based on partnerships
<b>Public management paradigm</b>	New public Management: Increasingly contractual management and strategic FM		Network governance: FM-organisation as broker and negotiator between private owners and ESCOs FM organisation unit increasingly integrated with other sustainability initiatives
<b>Type of innovation</b>	<b>Incremental:</b> Constant improvements, but no real innovation	<b>Radical:</b> Ways of delivering service is changed, but within existing FM framework	<b>Transformative:</b> ESCO experience leads to new roles and function of the FM organisation and new types of organisation

Table 1. Three approaches to ESCOs in municipal buildings, adapted from Hartley (2006)

#### 4.3. Energy retrofitting of municipal buildings as an in-house project

Our interviews with municipalities and ESCO operators have demonstrated that the main alternative to ESCO is to carry out energy retrofitting of municipal buildings as an in-house project. This concept is non-standardised and eclectic, as outlined by Colburn et al. (2005). It can include mixes of public efforts and outsourcing, different levels of ambitions, as well as the ‘do nothing’ alternative (Colburn et al., 2005). From interviews and studies of municipal practices, we can identify two predominant approaches to in-house energy retrofitting of municipal buildings:

A. Municipalities that for a prolonged time have carried out energy retrofitting and successive upgrading of the municipal building stock, and therefore have limited potential for energy



savings. The municipalities of Kolding, Skive and Albertslund are frequently mentioned examples of such an approach. Their saving potential is typically less than 10%, and they are therefore not regarded as potential ESCO municipalities. The ESCO suppliers do not see these municipalities as potential customers as they have proved that they have been able to manage energy retrofitting of the buildings as a part of FM and have the necessary competences in-house.

B. A group of municipalities that have no track record on gradual energy retrofitting, but decides to carry out an extensive energy retrofitting of the municipal buildings as an in-house project, and as an explicit alternative to an ESCO project. An example of this strategy is the municipality of Vejen. This municipality was strongly inspired by the ESCO project in the neighbouring municipality of Middelfart, and had several meetings with them, but “*..the more we heard, the more we thought that ‘we can do this ourselves’*” (civil servant, Vejen municipality). The main argument of the city council was that the municipality should have influence on the solutions being implemented to save energy; they did not want to buy energy savings only. Additionally, these solutions should be implemented concurrently with the general maintenance of the buildings. The municipality has 120 buildings with 210,000 m<sup>2</sup>. It was decided to lend DKK 52 m (EUR 7 m) for investments in the buildings, which would be paid back after 13 years due to reduced costs for energy services. The municipality has hired two energy specialists to go through the buildings, in order to identify energy-saving potential. This will take approx. 5 years, meaning that in the first years there will be no savings. This is longer time compared with Middelfart, where the analysis period took 1½ years. The types of solution will depend on the perceived problems in relation to the specific buildings.

#### 4.4. ESCO versus in-house energy retrofitting

We have asked municipalities as well as ESCO providers and consultants about their perception of the pros and cons of carrying out energy retrofitting of municipal buildings as an ESCO project versus an in-house project. The following issues of discussion seem to be crucial in the choice between the ESCO and the in-house approach:

##### *Financing and guaranteed savings*

A main reason for the municipality to enter an ESCO contract is the possibility of financing the improvements of many buildings over a short time; within a two-year period of analysis the ESCO supplier provides a sufficient basis for a full-scale implementation in the entire building portfolio, where energy savings are guaranteed by contract. ESCO providers argue that the strength of this approach, as opposed to the in-house approach, is that you start saving money from ‘day one’; The ESCO contractor mobilises energy retrofitting in a short time, and start saving energy almost immediately. The in-house approach operates with a smaller in-house staff, which prolongs the period of analysis before building retrofitting is implemented, and energy savings are reached. This result in a stepwise model where results are reached gradually, as a contrast to the ESCO model that includes more instant results (see Figure 1).

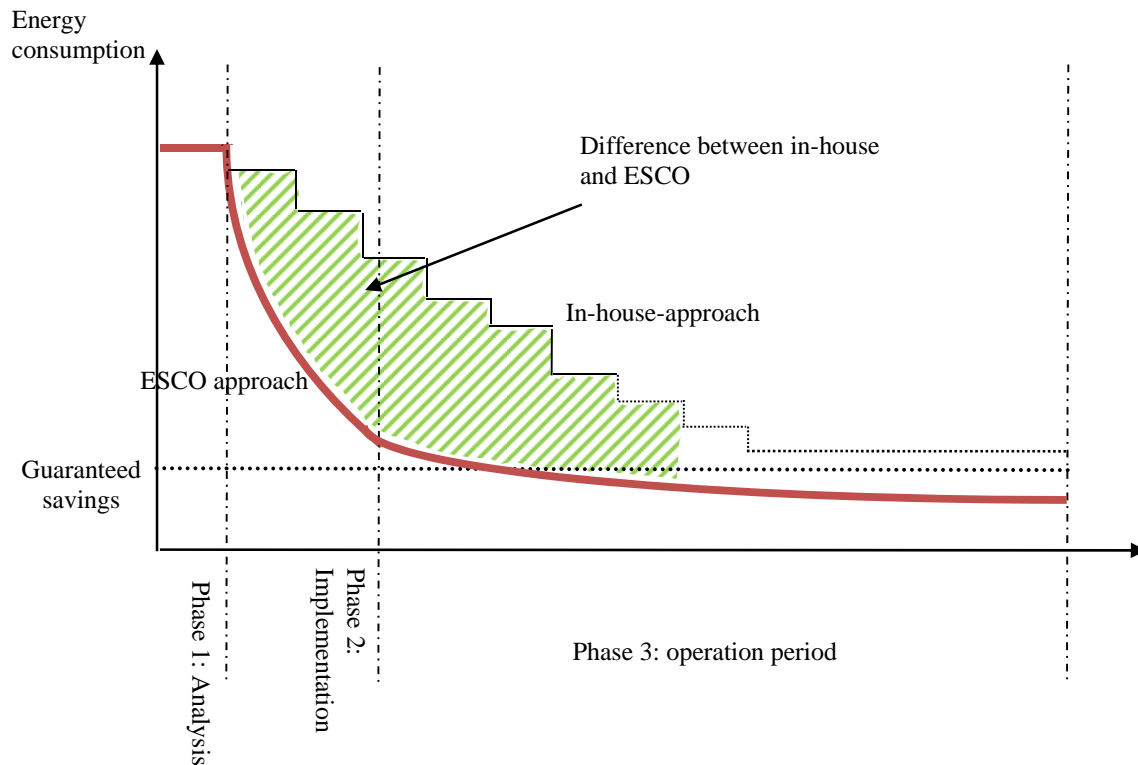


Figure 1. The principal difference between ESCO and in-house approach, as a way to increase energy efficiency in municipal buildings, as seen by ESCO providers and ESCO consultants.

If the municipality should finance the renovations traditionally, there would normally only be room for gradual improvements, due to the limitations of municipal budgets and manpower. In an ESCO project the municipality raise loans for the entire project at one time. As an illustration, one municipality stated that it could have had DKK 1 m per year (EUR 130,000) for an in-house retrofitting over the coming years, but the ESCO contract gave them DKK 68 m (EUR 9 m). For some municipalities, financing might be the main reason, as they see themselves as capable of completing the building improvements themselves.

A main argument against ESCO is, however, also financial. A survey from 2010 showed that the main reason for municipalities not to enter ESCO contracting is a better economy by doing it yourself; 82% of the municipal directors claim that in terms of economy it is better to finance the improvements in other ways than as an ESCO contract. Nevertheless, such financing is difficult to find, and it is an open question what the alternative to ESCO financing there is. One possibility is municipal equity, another is funding from the ordinary budget, but this would be possible only for major municipalities. The question of the administrative capacity to carry out the building improvements is usually not mentioned in the discussion of the pros and cons on ESCO, but it is very important for especially the smaller municipalities. As one municipality explains: *"It would take a long time to establish an organisation that could manage an assignment like that, and we would have to start to downsize it almost as soon as we had started"* (civil servant, municipality of Vallensbæk). In a similar way, other municipalities state, that it would have been completely impossible to carry out such a task with their staff, which is

usually very small. Keeping this task in-house therefore requires a major re-organisation, which for many municipalities would be unrealistic.

#### *Flexibility and transaction costs*

Proponents of ESCO argue that ESCO is a partnering constellation leading to a two-way flexibility that allow the local government to coordinate the energy-renovation implementation conducted by ESCO with regular building maintenance as well as change in political priorities, such as sale of buildings. However, since ESCO is also based on a contract, based on strict legislation on tender, both local governments and an ESCO supplier have pointed out the rigid aspects of the initial licensing. A local government undertaking an ESCO project typically increases its knowledge of ESCO during the process, but is unable to enlarge the amount of buildings involved due to legislation.

Proponents of the in-house approach argue that it allows local government to integrate regular building maintenance with energy retrofitting, thus making more comprehensive, effective and flexible refurbishments. If the ceiling lighting has to be replaced why not use the budget for building maintenance to replace the ceiling and re-insulate? The ESCO projects however demonstrate that it is possible to combine municipal maintenance with the ESCO project. If, for instance, the municipal FM refurbishes the facades, it will affect the energy efficiency of the building. Therefore a re-calculation of the base-line is necessary. As energy efficiency can be assessed relative objectively, the challenge is limited, but such negotiations and recalculations might be seen as 'transaction costs'.

Another issue is the change of strategies. The proponents of the in-house approach argue that local governments in the future face big challenges concerning care of children and senior citizens as a result of radical changes in economy and demographics. These challenges in the welfare landscape make it a very open question, whether the existing building stock will be the same the next 20 years, and whether some energy refurbishment may have been implemented in vain, since the owner of buildings and users may have been replaced. With the in-house approach, the politicians have a yearly opportunity for adapting the energy refurbishment to political strategies, such as larger units of public institutions, thereby providing more flexibility.

#### *Capacity building*

Proponents of both ESCO and the in-house approach argue that the respective approaches could be used for a much needed capacity building in the municipal FM organisation, especially on energy retrofitting and FM management as such. As shown in Vejen's in-house approach, the politicians found it very important to have a more skilled FM organisation afterwards, which they thought was better achieved if they carried out the energy retrofitting themselves. From a project perspective, they argue that an in-depth knowledge of your building portfolio means that you know exactly where to start implementing renovation-initiatives. This allows you to save the salary of consultants, and at the same time to start saving money from 'day one'. Moreover, the in-house approach gives them full control over what technical solutions to implement, thereby tailoring the energy-saving solutions to the different type of buildings – whereas from their viewpoint, ESCO suppliers might be prone to standardised solutions like expensive CTS technology.

The ESCO municipalities also argue that the FM organisation needs a certain capacity to manage an ESCO project. One spearhead ESCO municipality argued that a strategic purpose of

ESCO was to demonstrate to the politicians that if you reduce the FM organisation too much, you actually lose money as you have to hire expensive consultants to provide basic energy saving services. Another ESCO municipality argued that if you want to get the most out of an ESCO, you have to have the in-house capacities to challenge and control the ESCO supplier, as well as to take advantage of the learning generated during the partnering process. A conclusion of this discussion is, that in order to get capacity building regardless of models, you need to have a powerful FM organisation, or at least a strategy for enhancing the organisation, in order to take full advantage of ESCO and the in-house approach.

#### *Fix point of political strategies*

Proponents of ESCO argue that the contractual agreement forces local government to stick to the energy strategy, thus making it very unlikely that eventual change in city council priorities affect the energy retrofitting strategy. This commitment in a political strategy is not enforced in the same way in the in-house approach. Proponents of the in-house approach on the other hand argue that the long repayment period of loan financing is strong enough in itself, and that commitment to other political strategies in Denmark such as “Curve-Cracker Agreement” and “Climate Municipality” are altogether sufficient to keep the energy retrofitting strategy fixed.

The argument for keeping competences in-house also might reflect more ideological views on public-private partnerships. However, in practice the option for an in-house-strategy is limited to major municipalities with a large staff, more competences and better economic resources. As our interviews also show, it is practically impossible for smaller municipalities.

In Table 2 we have summarised the different characteristics of the in-house and the ESCO strategy.

	In-house	ESCO
Financing	<ul style="list-style-type: none"> <li>• Step-wise renovation due to budget limitations</li> <li>• Long-term financing uncertain</li> </ul>	<ul style="list-style-type: none"> <li>• Guarantee for energy savings is politically attractive</li> <li>• Energy savings from ‘day one’</li> </ul>
Transaction costs	<ul style="list-style-type: none"> <li>• Low transaction costs</li> </ul>	<ul style="list-style-type: none"> <li>• Transaction costs in partnership, require minimum building volume to make ESCO profitable</li> </ul>
Capacity building	<ul style="list-style-type: none"> <li>• Keeps competences in-house, more hands-on influence on solutions</li> </ul>	<ul style="list-style-type: none"> <li>• Learning and innovation from ESCO partnership (also depends on ESCO approach)</li> </ul>
Fixation and flexibility	<ul style="list-style-type: none"> <li>• Flexible in relation to uncertainty on future building portfolio</li> <li>• Coordination between energy retrofitting and building maintenance easier</li> </ul>	<ul style="list-style-type: none"> <li>• ESCO reduces the risk of reductions in future investments in energy savings due to possible changes in political priorities</li> </ul>

Table 2. Main differences between municipal ESCO and in-house strategy.

## 4.5. Perspectives

*Different ESCO approaches and market development*

The different ESCO approaches reflect possible developments of the ESCO market. One development could be a relatively standardised market. An ESCO supplier compared this with the Swedish market, which is the most mature market in Scandinavia, but where ESCO to a higher degree has also become a 'standard commodity' and the ambitions for using ESCO in a more innovative (integrated and strategic) way, is limited. Typically, ESCOs are run as projects in the property administration, and receive limited attention, whereas in Denmark the political attention paid to ESCO is great, and often presented on the political level of the municipality.

Consultants and ESCO providers see the more integrated approach as the future trend, and they also advocate for this solution. A main challenge is that the traditional approach of the ESCO, the guarantee for energy savings, also becomes a lock for more innovative development with ESCO, including a limitation of the volume of buildings and goals included in the contract; ESCO suppliers and consultants advocate for partnerships instead of guarantees. *"In Denmark we are used to buying a commodity. But if you want to get the most out of it, you should buy a partnership. Thus we preach 'partnership' in the tender, and to think flexibility. It is not legislation hindering this, it is culture"* (ESCO supplier).

However, we argue that the different approaches to ESCO have been a main precondition for the growth of the concept. The approach chosen in the municipality generally is conditioned by the local context (institutional history; the existing capacity of the municipal FM organisation) – but also by the long-term *political* and *administrative visions* of the individual municipality. For instance, the standard ESCO model in Vallensbæk corresponds with a small municipal FM organisation being trained in outsourcing, with no ambitions of using the ESCO as a learning process. The strategic ESCO approach in Middelfart reflects an ambitious overall municipal strategy, where the concept of ESCO fits in well, and the strategic ESCO project becomes a potential *strategic innovation*: the municipality adopts the strategy of network governance hoping to generate green growth. The ambition of Kalundborg Municipality is to use ESCO as lever for being a 'first mover' on energy retrofitting, setting the scene for national capacity building in this sector through establishing collaborations with industries in the municipality.

It illustrates that the potential for ESCO contracting is not a simple question, but depends on the strategy and the political commitment in the municipality. The future success of ESCO will depend on how the ESCO concept develops in practice in the municipalities: as a standardised and easily applicable product, or as a non-standardised smaller, but more innovative concept?

*ESCO or in-house?*

Our findings also suggest that the attention on ESCO projects inspires some municipalities to carry out energy refurbishment as in-house projects. What we see is perhaps a growing trend that some municipalities 'copy' some functions of ESCO as a concept: replacing the ESCO expertise with own staff; having an already experienced staff capable of doing the building analysis and tendering themselves. However, we still need proofs of actual municipal action on extended in-house retrofitting; we have little data and overview of in-house initiatives, and less documentation in terms of baselines and accounting of the initiatives. Because of limited data, it still remains a point of discussion to which extent the 'in-house ESCOs lose some energy-saving potential by having a prolonged analysis and implementation phase. Moreover, the results over time for the in-house strategy remains open, as most projects are just a few years old.

The discussion of ESCO versus in-house strategies raises an important discussion about the capacity and role of the municipal FM organisation. We agree with Colburn et al. (2005) that in-house competences and ESCOs should not be seen as contradictions, but as two concepts reinforcing each other. Municipalities involved in strategic projects see internal capacity building as a central part of the ESCO project, both in the short term and in the long term: The ESCO project might be seen as a first step in developing a strong in-house capacity over time.

Yet, for many municipalities, it is not practically viable to carry out an 'in-house' model comparable to the ESCO project, due to the small size of the FM unit. In this respect, ESCOs have promoted major progress on energy savings for smaller municipalities that would not have been possible to carry out as in-house projects.

The observations on in-house projects and different approaches to ESCO support our thesis, that ESCOs, and an entire ESCO market, should not only be judged on the number of ESCOs, but on the way in which it helps to reach a target, namely energy efficiency in municipal buildings, adequate buildings for the users, as well as stimulating innovation and capacity building in the municipal FM organisation.

## 5 PRACTICAL IMPLICATIONS

For municipalities with ambitions to improve their own building portfolio on energy efficiency, our results so far can be used to qualify decisions on choice of in-house model versus different ESCO approaches. In short, we can characterise the options:

- The basic ESCO approach is politically attractive, with limited investments, guaranteed energy savings and low pay-back time. It requires little innovation for the FM organisation, and can be run as an out-sourcing project. What you might fail to achieve, compared with an integrated approach, is a more ambitious and widespread upgrading of the buildings, as well as potentially developing the FM organisation in a partnership with the ESCO supplier.
- The integrative ESCO approach can be used to pursue goals for a general improvement of the municipal building stock. This approach requires a greater degree of partnership with the ESCO provider, and more political commitment as payback-periods will be longer. This approach might lead to more ambitious and innovative concepts on how to achieve energy savings, as well as how to develop the role of the FM organisation in the municipality.
- The strategic ESCO approach implies an ambitious attitude to energy reductions in the entire municipality, building competences inside and outside the FM organisation, using public-private collaboration and networked governance, and thereby redefining the role of the FM organisation in the municipal organisation. This approach implies that the FM unit form partnerships with the ESCO provider, and increasingly works in partnerships and networks to involve a wider range of actors to work for energy savings in the municipality as a geographic entity.
- The in-house model is viable for municipalities with a relatively large FM organisation. The potential for the in-house model include saved costs for the ESCO provider, more control of the specific solutions on the municipal buildings, and a more flexible strategy, not being bound to a contract. What you might miss in the in-house model is a guarantee on energy savings, a faster pace and instant energy savings, plus the safety in the contract, meaning that possible political shifts will not take away the investments on

energy savings. For the FM organisation, the in-house project might however not hold the same innovation potential as an integrated ESCO project.

It is important to be aware of the different long-term implications of the different models. Therefore professional support is recommended in defining the visions for the project, as well as in formulating the tender (in case of an ESCO project). We argue that the large potential for energy savings in public buildings should be exploited by the municipalities to formulate and gain political support for more visionary projects on the municipal buildings, and to develop innovative strategies on how to realise energy savings and improve FM functions. Finally we argue that ESCO is not necessarily a contrast to improving the internal capacity building. Instead, the partnership included in ESCO projects might include great innovation opportunities for the municipal FM organisation, giving it a more active role in developing urban sustainability.

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